

16. (New) A portable camera as claimed in claim 1, wherein said script is printed on the surface of the portable card.

17. (New) A portable camera as claimed in claim 1, wherein said script is in the form of an array of dots representing bits of the script.

REMARKS

The applicant has also taken the opportunity to reformat the list on page 1 back into a table format. By way of explanation, the amendments which have been made to the specification update the table of cross-referenced, simultaneously filed, patent applications. On 10 July 1998, 184 patent applications were filed simultaneously by the applicant at the USPTO covering many different inventions made as part of a complex digital imaging and printing project. The present application is one of those 184 simultaneously filed applications. Those simultaneously filed applications were initially identified in the originally filed specification by their docket numbers of the US filing and for additional identification purposes by their corresponding Australian provisional patent application numbers and filing dates. The reason for identifying the cross-referenced application in this way was simply because, at the time of filing the present application, the US filing details of the simultaneously filed applications, having been filed on the same day as the present application, were not yet known or available.

Now that the US application numbers are known and in order more clearly to identify the cross-referenced applications, the US application numbers have been added in addition to the Australian provisional application numbers.

Further, the previous change of the charts from landscape view to portrait view was made purely to make it easier to read the specification. The docket numbers have been re-inserted.

A substitute specification is attached. Also, marked up copies of the amended pages of the substitute specification are attached. Due to the large volume of pages we have not included a marked-up copy of the whole specification. No new matter has been added.

The official action and the citations raised by the Examiner have been carefully considered. In response to the Official Action, claim 1 has been amended, and claim 2 has been deleted. New claims 16 and 17 have been added. The proposed amendments are fully supported by the specification, and do not add new matter.

Responsive to item 1 of the Final Action, the abstract has now been amended to meet the requirements of language and format.

At items 2 and 3 of the Official Action, the Examiner rejects claims 1, 2 and 4 to 15 under 35 U.S.C. 103(a) as being unpatentable over US 6,006,039 (Steinberg) in view of US 5,757,388 (Stephenson). The Examiner's comments in this regard have been carefully considered. At item 3 of the Official Action, it is asserted that Steinberg discloses a portable camera (10) for capturing a digital image and an integral programming language interpreter means for manipulation of the digital image and a script input means (18) for inputting a program script on a card (22), wherein the script is executed to modify the image.

It has been noted that Steinberg fails to disclose or suggest an integral printer device. However, it is further noted that the camera of Steinberg is 'programmed by an external device' (eg see Abstract, Col 2 lines 19, 23, etc), and does not include a script input means comprising a card reader for reading a script stored on a portable card in print form. It is respectfully submitted that this feature of the present invention provides a distinct advantage over the prior art, in that a user of a camera in accordance with the present invention can carry a significant number of portable cards, each containing a differing program script. Consequently, the user can decide at the time of capturing an image which modification of an image they wish to be performed, and select a corresponding card to insert into the script input means. Further, the user of the camera of the present invention has the opportunity to purchase a portable card and, without the need to return to an external programming device such as that required by Steinberg, can immediately use such a card due to the integral interpreter means present in the camera. This capability offered by the present invention is particularly advantageous when the user is away from an appropriate external programming device for extended periods of time, for example when on vacation.

To the contrary, and as shown in Figure 1, the arrangement disclosed by Steinberg requires that the camera device 10 is in electrical communication with an external device such as personal computer 14, in order that the camera can be programmed by that external device (eg see Col 4 lines 32, 33). However, users are rarely close to a personal computer or

other external programming device when using a camera, and so the user of the camera disclosed by Steinberg must be satisfied with existing operational parameters stored in the camera, until the next occasion they have the opportunity to access different operational parameters from PC 14. On extended trips such as overseas vacations, this will rarely be a satisfactory situation for the user. It is noted that means 20, 30 and 22 shown in Fig 1 of Steinberg merely provide electrical communication from the external programming device to the camera, and that it remains essential to Steinberg that programming instructions are defined by external programming means 14. This is evident, for example, at Col 2 lines 18 and 19, where it is stated that a microprocessor of the camera device of Steinberg merely passively accepts data from an external programming device. Steinberg fails to disclose or suggest either script input means or interpreter means as required by amended claim 1 of the present application, and accordingly it is respectfully submitted that the present invention as defined by amended claim 1 is neither disclosed or suggested by Steinberg.

Further, it is respectfully submitted that Steinberg fails to disclose a program script that could define manipulation and modification of an image to produce visual alterations thereof. Steinberg merely discloses that camera 10 may passively receive data from an external device, the data defining operational parameters such as aperture, or consisting of graphics information and text information which "can be recorded along with" a captured image or "displayed/overlaid as part of" the image (Col 2 lines 53 to 55). For example Steinberg discloses that a graphic item such as a logo may be placed over the image (Col 5 line 11, Fig 3 items 123, 125), or that copyright information may be placed over the image (Col 6 line 67). However, such actions merely obscure a portion of the captured image, and do not manipulate or modify the captured digital image to produce visual alterations thereof. Nor is such manipulation merely equivalent to such graphic/text overlays, as a program script is necessary to define a visual modification which can be applied to any arbitrary input image. As noted, Steinberg fails to disclose inputting a program script to a camera device, but merely provides data such as a graphic logo to be placed over the image without need for the camera device to undertake any image manipulation under the control of a program script. Accordingly, for this reason also, it is respectfully submitted that Steinberg fails to disclose or suggest the features of the present invention.

In considering Steinberg in view of Stephenson, it is noted that the contribution of Stephenson to such a combination is merely the feature of a printer coupled to a camera.

Stephenson fails to disclose or suggest the features discussed above, and accordingly it is submitted that the present invention is novel and non-obvious over Steinberg in view of Stephenson.

Prior to addressing item 4 of the Official Action, it is convenient to turn to item 5. At item 5 of the Official Action, the Examiner asserts that claims 1, 2 and 4 to 15 are unpatentable over Steinberg in view of US 4,937,676 (Finelli). However, for the above reasons, it is submitted that Steinberg fails to disclose or suggest a number of features of the present invention as defined by amended claim 1. In considering Steinberg in view of Finelli, it is noted once again that the contribution of Finelli to such a combination is merely the feature of a printer coupled to a camera. Finelli fails to disclose or suggest the features discussed above, and accordingly it is submitted that the present invention is novel and non-obvious over Steinberg in view of Finelli.

Turning now to item 4 of the Official Action, it is noted that the Examiner asserts that claims 1-15 are unpatentable over US 5,999,697 (Murase) in view of Stephenson. It has been noted that Murase fails to disclose or suggest an integral printer device. Further, Murase does not disclose or suggest a script input means comprising a card reader for reading a script stored on a portable card in print form. Additionally, although Murase states that characters or patterns may be stored on a computer disc 'along with' a captured image, Murase only discloses that such characters or patterns can be displayed 'over' the captured image to obscure a part of the image, for example by placement of a frame around the image (eg Col 4 lines 53 to 55). Murase fails to disclose or suggest manipulation and modification of the image to produce visual alterations thereto, and accordingly it is submitted that Murase fails to disclose or suggest the features of the present invention as defined by amended claim 1.

In considering Murase in view of Stephenson, it is noted that the contribution of Stephenson to such a combination is merely the feature of a printer coupled to a camera. Stephenson fails to disclose or suggest the features discussed above, and accordingly it is submitted that the present invention is novel and non-obvious over Murase in view of Stephenson.

Finally, turning to item 6 of the Official Action, it is noted that the Examiner asserts that claims 1 to 15 are unpatentable over Murase in view of Finelli. However, for the above reasons, it is submitted that Murase fails to disclose or suggest a number of features of the

present invention as defined by amended claim 1. In considering Murase in view of Finelli, it is noted once again that the contribution of Finelli to such a combination is merely the feature of a printer coupled to a camera. Finelli fails to disclose or suggest the features discussed above, and accordingly it is submitted that the present invention is novel and non-obvious over Murase in view of Finelli.

It is submitted that the preceding arguments illustrate that claim 1 as amended is in a format ready for acceptance. Given that claims 2 to 15 depend from claim 1, it is submitted that claims 2 to 15 are patentably distinguishable over the cited prior art at least by virtue of dependency on claim 1.

CONCLUSION

It is respectfully submitted that all of the Examiner's objections have been successfully traversed. Accordingly, it is submitted that the application is now in condition for allowance. Reconsideration and allowance of the application is courteously solicited.

Very respectfully,

Applicant:



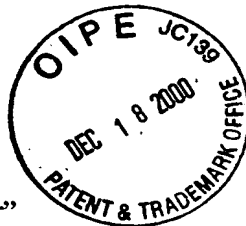
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DEC 26 2000
TC 2800 MAIL ROOM

TITLE OF INVENTION

"Camera System with Computer Language Interpreter"

INVENTOR:

Kia Silverbrook and Paul Lapstun

CROSS REFERENCES TO RELATED APPLICATIONS

~~The following co-pending US patent applications, identified by their US patent application serial numbers (USSN), were filed simultaneously to the present application on July 10, 1998, and are hereby incorporated by cross-reference.~~ The following Australian provisional patent applications are hereby incorporated by cross-reference. For the purposes of location and identification, US patent applications identified by their US patent application serial numbers (USSN) are listed alongside the Australian applications from which the US patent applications claim the right of priority.

CROSS-REFERENCED AUSTRALIAN PROVISIONAL PATENT APPLICATION NO.	US PATENT/PATENT APPLICATION (CLAIMING RIGHT OF PRIORITY FROM AUSTRALIAN PROVISIONAL APPLICATION)	DOCKET NO.
PO7991	09/113,060	ART01
PO8505	09/113,070	ART02
PO7988	09/113,073	ART03
PO9395	09/112,748	ART04
PO8017	09/112,747	ART06
PO8014	09/112,776	ART07
PO8025	09/112,750	ART08
PO8032	09/112,746	ART09
PO7999	09/112,743	ART10
PO7998	09/112,742	ART11
PO8031	09/112,741	ART12
PO8030	09/112,740	ART13
PO7997	09/112,739	ART15
PO7979	09/113,053	ART16
PO8015	09/112,738	ART17
PO7978	09/113,067	ART18
PO7982	09/113,063	ART19
PO7989	09/113,069	ART20
PO8019	09/112,744	ART21
PO7980	09/113,058	ART22
PO8018	09/112,777	ART24
PO7938	09/113,224	ART25
PO8016	09/112,804	ART26
PO8024	09/112,805	ART27
PO7940	09/113,072	ART28

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CROSS-REFERENCED AUSTRALIAN PROVISIONAL PATENT APPLICATION No.	US PATENT/PATENT APPLICATION (CLAIMING RIGHT OF PRIORITY FROM AUSTRALIAN PROVISIONAL APPLICATION)	DOCKET No.
PO7939	09/112,785	ART29
PO8501	09/112,797	ART30
PO8500	09/112,796	ART31
PO7987	09/113,071	ART32
PO8022	09/112,824	ART33
PO8497	09/113,090	ART34
PO8020	09/112,823	ART38
PO8023	09/113,222	ART39
PO8504	09/112,786	ART42
PO8000	09/113,051	ART43
PO7977	09/112,782	ART44
PO7934	09/113,056	ART45
PO7990	09/113,059	ART46
PO8499	09/113,091	ART47
PO8502	09/112,753	ART48
PO7981	09/113,055	ART50
PO7986	09/113,057	ART51
PO7983	09/113,054	ART52
PO8026	09/112,752	ART53
PO8027	09/112,759	ART54
PO8028	09/112,757	ART56
PO9394	09/112,758	ART57
PO9396	09/113,107	ART58
PO9397	09/112,829	ART59
PO9398	09/112,792	ART60
PO9399	6,106,147	ART61
PO9400	09/112,790	ART62
PO9401	09/112,789	ART63
PO9402	09/112,788	ART64
PO9403	09/112,795	ART65
PO9405	09/112,749	ART66
PP0959	09/112,784	ART68
PP1397	09/112,783	ART69
PP2370	09/112,781	DOT01
PP2371	09/113,052	DOT02
PO8003	09/112,834	Fluid01
PO8005	09/113,103	Fluid02
PO9404	09/113,101	Fluid03
PO8066	09/112,751	IJ01
PO8072	09/112,787	IJ02
PO8040	09/112,802	IJ03
PO8071	09/112,803	IJ04

CROSS-REFERENCED AUSTRALIAN PROVISIONAL PATENT APPLICATION NO.	US PATENT/PATENT APPLICATION (CLAIMING RIGHT OF PRIORITY FROM AUSTRALIAN PROVISIONAL APPLICATION)	DOCKET NO.
PO8047	09/113,097	IJ05
PO8035	09/113,099	IJ06
PO8044	09/113,084	IJ07
PO8063	09/113,066	IJ08
PO8057	09/112,778	IJ09
PO8056	09/112,779	IJ10
PO8069	09/113,077	IJ11
PO8049	09/113,061	IJ12
PO8036	09/112,818	IJ13
PO8048	09/112,816	IJ14
PO8070	09/112,772	IJ15
PO8067	09/112,819	IJ16
PO8001	09/112,815	IJ17
PO8038	09/113,096	IJ18
PO8033	09/113,068	IJ19
PO8002	09/113,095	IJ20
PO8068	09/112,808	IJ21
PO8062	09/112,809	IJ22
PO8034	09/112,780	IJ23
PO8039	09/113,083	IJ24
PO8041	09/113,121	IJ25
PO8004	09/113,122	IJ26
PO8037	09/112,793	IJ27
PO8043	09/112,794	IJ28
PO8042	09/113,128	IJ29
PO8064	09/113,127	IJ30
PO9389	09/112,756	IJ31
PO9391	09/112,755	IJ32
PP0888	09/112,754	IJ33
PP0891	09/112,811	IJ34
PP0890	09/112,812	IJ35
PP0873	09/112,813	IJ36
PP0993	09/112,814	IJ37
PP0890	09/112,764	IJ38
PP1398	09/112,765	IJ39
PP2592	09/112,767	IJ40
PP2593	09/112,768	IJ41
PP3991	09/112,807	IJ42
PP3987	09/112,806	IJ43
PP3985	09/112,820	IJ44
PP3983	09/112,821	IJ45
PO7935	09/112,822	IJM01

CROSS-REFERENCED AUSTRALIAN PROVISIONAL PATENT APPLICATION No.	US PATENT/PATENT APPLICATION (CLAIMING RIGHT OF PRIORITY FROM AUSTRALIAN PROVISIONAL APPLICATION)	DOCKET No.
PO7936	09/112,825	IJM02
PO7937	09/112,826	IJM03
PO8061	09/112,827	IJM04
PO8054	09/112,828	IJM05
PO8065	6,071,750	IJM06
PO8055	09/113,108	IJM07
PO8053	09/113,109	IJM08
PO8078	09/113,123	IJM09
PO7933	09/113,114	IJM10
PO7950	09/113,115	IJM11
PO7949	09/113,129	IJM12
PO8060	09/113,124	IJM13
PO8059	09/113,125	IJM14
PO8073	09/113,126	IJM15
PO8076	09/113,119	IJM16
PO8075	09/113,120	IJM17
PO8079	09/113,221	IJM18
PO8050	09/113,116	IJM19
PO8052	09/113,118	IJM20
PO7948	09/113,117	IJM21
PO7951	09/113,113	IJM22
PO8074	09/113,130	IJM23
PO7941	09/113,110	IJM24
PO8077	09/113,112	IJM25
PO8058	09/113,087	IJM26
PO8051	09/113,074	IJM27
PO8045	6,111,754	IJM28
PO7952	09/113,088	IJM29
PO8046	09/112,771	IJM30
PO9390	09/112,769	IJM31
PO9392	09/112,770	IJM32
PP0889	09/112,798	IJM35
PP0887	09/112,801	IJM36
PP0882	09/112,800	IJM37
PP0874	09/112,799	IJM38
PP1396	09/113,098	IJM39
PP3989	09/112,833	IJM40
PP2591	09/112,832	IJM41
PP3990	09/112,831	IJM42
PP3986	09/112,830	IJM43
PP3984	09/112,836	IJM44
PP3982	09/112,835	IJM45

CROSS-REFERENCED AUSTRALIAN PROVISIONAL PATENT APPLICATION No.	US PATENT/PATENT APPLICATION (CLAIMING RIGHT OF PRIORITY FROM AUSTRALIAN PROVISIONAL APPLICATION)	DOCKET No.
PP0895	09/113,102	IR01
PP0870	09/113,106	IR02
PP0869	09/113,105	IR04
PP0887	09/113,104	IR05
PP0885	09/112,810	IR06
PP0884	09/112,766	IR10
PP0886	09/113,085	IR12
PP0871	09/113,086	IR13
PP0876	09/113,094	IR14
PP0877	09/112,760	IR16
PP0878	09/112,773	IR17
PP0879	09/112,774	IR18
PP0883	09/112,775	IR19
PP0880	6,152,619	IR20
PP0881	09/113,092	IR21
PO8006	6,087,638	MEMS02
PO8007	09/113,093	MEMS03
PO8008	09/113,062	MEMS04
PO8010	6,041,600	MEMS05
PO8011	09/113,082	MEMS06
PO7947	6,067,797	MEMS07
PO7944	09/113,080	MEMS09
PO7946	6,044,646	MEMS10
PO9393	09/113,065	MEMS11
PP0875	09/113,078	MEMS12
PP0894	09/113,075	MEMS13

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable.

FIELD OF THE INVENTION

The present invention relates to an data processing method and apparatus and, in particular, discloses a Camera System with Language Interpreter.

The present invention further relates to a camera having an one board interpreter for the interpreting of a programming language to manipulate and subsequently print out an image.

BACKGROUND OF THE INVENTION

Recently, digital camera technology has become increasingly popular. In this form of technology, an image is normally imaged by CCD array. Subsequently, the images are stored on the camera on storage media such as a

high quality, high speed, low cost printing applications. To meet the requirements of digital photography, new ink jet technologies have been created. The target features include:

- low power (less than 10 Watts).
- high resolution capability (1,600 dpi or more)
- photographic quality output
- low manufacturing cost
- small size (pagewidth times minimum cross section)
- high speed (< 2 seconds per page).

All of these features can be met or exceeded by the ink jet systems described below with differing levels of difficulty. Forty-five different ink jet technologies have been developed by the Assignee to give a wide range of choices for high volume manufacture. These technologies form part of separate applications assigned to the present Assignee as set out in the list under the heading Cross References to Related Applications.

The ink jet designs shown here are suitable for a wide range of digital printing systems, from battery powered one-time use digital cameras, through to desktop and network printers, and through to commercial printing systems

For ease of manufacture using standard process equipment, the print head is designed to be a monolithic 0.5 micron CMOS chip with MEMS post processing. For color photographic applications, the print head is 100 mm long, with a width which depends upon the ink jet type. The smallest print head designed is covered in US Patent Application No. 09/112,764, which is 0.35 mm wide, giving a chip area of 35 square mm. The print heads each contain 19,200 nozzles plus data and control circuitry.

Ink is supplied to the back of the print head by injection molded plastic ink channels. The molding requires 50 micron features, which can be created using a lithographically micromachined insert in a standard injection molding tool. Ink flows through holes etched through the wafer to the nozzle chambers fabricated on the front surface of the wafer. The print head is connected to the camera circuitry by tape automated bonding.

Tables of Drop-on-Demand Ink Jets

~~The present invention is useful in the field of digital printing, in particular, ink jet printing. A number of patent applications in this field were filed simultaneously and incorporated by cross reference.~~ 25
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Eleven important characteristics of the fundamental operation of individual ink jet nozzles have been identified. These characteristics are largely orthogonal, and so can be elucidated as an eleven dimensional matrix. Most of the eleven axes of this matrix include entries developed by the present assignee.

The following tables form the axes of an eleven dimensional table of ink jet types.

- Actuator mechanism (18 types)
- Basic operation mode (7 types)
- Auxiliary mechanism (8 types)
- Actuator amplification or modification method (17 types)
- Actuator motion (19 types)
- Nozzle refill method (4 types)
- Method of restricting back-flow through inlet (10 types)
- Nozzle clearing method (9 types)

ACTUATOR MECHANISM (APPLIED ONLY TO SELECTED INK DROPS)				
	Description	Advantages	Disadvantages	Examples
Thermal bubble	<p>An electrothermal heater heats the ink to above boiling point, transferring significant heat to the aqueous ink. A bubble nucleates and quickly forms, expelling the ink.</p> <p>The efficiency of the process is low, with typically less than 0.05% of the electrical energy being transformed into kinetic energy of the drop.</p>	<p>Large force generated</p> <p>Simple construction</p> <p>No moving parts</p> <p>Fast operation</p> <p>Small chip area required for actuator</p>	<p>High power</p> <p>Ink carrier limited to water</p> <p>Low efficiency</p> <p>High temperatures required</p> <p>High mechanical stress</p> <p>Unusual materials required</p> <p>Large drive transistors</p> <p>Cavitation causes actuator failure</p> <p>Kogation reduces bubble formation</p> <p>Large print heads are difficult to fabricate</p>	<p>Canon Bubblejet 1979</p> <p>Endo et al GB patent 2,007,162</p> <p>Xerox heater-in-pit 1990 Hawkins et al USP 4,899,181</p> <p>Hewlett-Packard TIJ 1982 Vaught et al USP 4,490,728</p>
Piezo-electric	<p>A piezoelectric crystal such as lead lanthanum zirconate (PZT) is electrically activated, and either expands, shears, or bends to apply pressure to the ink, ejecting drops.</p>	<p>Low power consumption</p> <p>Many ink types can be used</p> <p>Fast operation</p> <p>High efficiency</p>	<p>Very large area required for actuator</p> <p>Difficult to integrate with electronics</p> <p>High voltage drive transistors required</p> <p>Full pagewidth print heads impractical due to actuator size</p> <p>Requires electrical poling in high field strengths during manufacture</p>	<p>Kyser et al USP 3,946,398</p> <p>Zoltan USP 3,683,212</p> <p>1973 Stemme USP 3,747,120</p> <p>Epson Stylus</p> <p>Tektronix IJ04</p>
Electro-strictive	<p>An electric field is used to activate electrostriction in relaxor materials such as lead lanthanum zirconate titanate (PLZT) or lead magnesium niobate (PMN).</p>	<p>Low power consumption</p> <p>Many ink types can be used</p> <p>Low thermal expansion</p> <p>Electric field strength required (approx. 3.5 V/μm) can be generated without difficulty</p> <p>Does not require electrical poling</p>	<p>Low maximum strain (approx. 0.01%)</p> <p>Large area required for actuator due to low strain</p> <p>Response speed is marginal ($\sim 10 \mu$s)</p> <p>High voltage drive transistors required</p> <p>Full pagewidth print heads impractical due to actuator size</p>	<p>Seiko Epson, Usui et al JP 253401/96</p> <p>IJ04</p>

ACTUATOR MECHANISM (APPLIED ONLY TO SELECTED INK DROPS)				
	Description	Advantages	Disadvantages	Examples
Ferro-electric	An electric field is used to induce a phase transition between the antiferroelectric (AFE) and ferroelectric (FE) phase. Perovskite materials such as tin modified lead lanthanum zirconate titanate (PLZSnT) exhibit large strains of up to 1% associated with the AFE to FE phase transition.	Low power consumption Many ink types can be used Fast operation ($< 1 \mu s$) Relatively high longitudinal strain High efficiency Electric field strength of around $3 V/\mu m$ can be readily provided	Difficult to integrate with electronics Unusual materials such as PLZSnT are required Actuators require a large area	IJ04
Electro-static plates	Conductive plates are separated by a compressible or fluid dielectric (usually air). Upon application of a voltage, the plates attract each other and displace ink, causing drop ejection. The conductive plates may be in a comb or honeycomb structure, or stacked to increase the surface area and therefore the force.	Low power consumption Many ink types can be used Fast operation	Difficult to operate electrostatic devices in an aqueous environment The electrostatic actuator will normally need to be separated from the ink Very large area required to achieve high forces High voltage drive transistors may be required Full pagewidth print heads are not competitive due to actuator size	IJ02, IJ04
Electro-static pull on ink	A strong electric field is applied to the ink, whereupon electrostatic attraction accelerates the ink towards the print medium.	Low current consumption Low temperature	High voltage required May be damaged by sparks due to air breakdown Required field strength increases as the drop size decreases High voltage drive transistors required Electrostatic field attracts dust	1989 Saito et al, USP 4,799,068 1989 Miura et al, USP 4,810,954 Tone-jet